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DORITY & MANNING, P.A.
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL
AND APPEAL BOARD

Ex parte JACKIE WINN

Appeal 2015-004703
Application 12/649,727
Technology Center 2800

Before BRADLEY R. GARRIS, MICHAEL P. COLAIANNI, and DEBRA L. DENNETT, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 the final rejection of claims 1–10, 17, 18, and 20–26. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We REVERSE.

Appellant's invention is directed to a method of gas flow control for a plasma arc torch by modulating the pressure and flow to a plasma arc torch

through cyclic pulsing of a flow control valve between states of fully open and fully closed (Spec. ¶ 1; Claims 1 and 17).

Claims 1 and 4 are illustrative:

> 1. A method for controlling gas flow to a plasma arc torch, the method comprising the steps of:
>
> providing a plasma gas supply in communication with the plasma arc torch;
>
> positioning a valve between the plasma gas supply and the plasma arc torch so as to control the flow of plasma gas to the torch, the valve having an inlet;
>
> connecting the valve and the plasma arc torch with a gas hose;
>
> determining the pressure of plasma gas provided to the valve inlet;
>
> ascertaining a frequency and duty cycle at which to cycle the valve between conditions of fully opened and fully closed using the pressure of the plasma gas provided to the valve inlet from said step of determining;
>
> cycling the valve, at the frequency and duty cycle provided by said step of ascertaining, between conditions of fully opened and fully closed; and
>
> using a resistance to gas flow provided by the torch to maintain a relatively constant flow of plasma gas to the plasma torch during said step of cycling the valve.
>
> 4. The method for controlling gas flow to a plasma arc torch as in claim 2, further comprising the step of providing a gas line between the valve and the plasma arc torch that does not include a pressure regulator.

Appellant appeals the following rejections:

1. Claim 4 is rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.
2. Claim 4 is rejected under 35 U.S.C. § 112, second paragraph, as failing to point out and particularly claim the invention.
3. Claims 8–10, 22, and 24 are rejected under 35 U.S.C. § 112, fourth paragraph, as containing subject matter that fails to further limit the claim from which it depends.
4. Claims 1–10, 17, 18, and 20–26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Higgins et al., (US 2006/0091115 A1, published May 4, 2006) in view of Hammer (US 5,355,214, issued Oct. 11, 1994).

FINDINGS OF FACT & ANALYSIS

REJECTIONS (1) AND (2): § 112, ¶¶ 1 and 2, Claim 4

The Examiner finds that the subject matter of claim 4 directed to not including a pressure regulator between the valve and the plasma arc torch lacks written descriptive support under § 112, ¶ 1 and concludes that the negative limitation of claim 4 renders the claim indefinite under § 112, ¶ 2 (Ans. 2–4). The Examiner's only finding to support the conclusion that claim 4 is indefinite under §112, ¶ 2 rejection is that the claim includes a negative limitation which discloses the invention by excluding what the inventor did not invent rather than reciting what the inventor did invent (Ans. 3).

Appellant argues that there is support in the Specification for the claim 4 limitation that the gas line between the valve and the plasma arc torch does not include a pressure regulator (App. Br. 5–8). Appellant contends that Figure 1 shows a gas hose 220 between valve 200 and torch 100 that does not have a pressure regulator in the gas line (App. Br. 7).

Regarding the § 112, ¶ 2 rejection, Appellant argues that the negative limitations are permitted as indicated in the *Manual of Patent Examining Procedure* (MPEP) § 2173.05(i) (App. Br. 9). Therefore, the presence of a negative limitation in a claim is not a sufficient basis alone to conclude that the claim is indefinite. *Id.*

We have fully considered the Examiner's findings and conclusions and Appellant's arguments there against. We find that the preponderance of the evidence favors Appellant's argument of written descriptive support and definiteness for the reasons argued by Appellant on pages 5 to 10 of the Appeal Brief.

We reverse the Examiner's § 112, ¶ 1 rejection for lack of written description and the Examiner's § 112, ¶ 2 rejection for indefiniteness.

REJECTION (3): § 112, ¶ 4

With regard to dependent claims 8, 9, and 22, the Examiner finds these claims fail to further limit the claim from which they depend because independent claims 1 and 17 recite a gas hose which performs the dampening function (Ans. 4–6). The Examiner finds that the dampening recited in the claims is a function of the volume gas contained in the hose and thus does not further limit the gas hose already recited in the independent claims. *Id.*

With regard to dependent claims 10 and 24, the Examiner finds that the recitation of providing a constant pressure to the plasma torch fails to further limit the recitation of "a constant flow of plasma gas" in independent claims 1 and 17 (Ans. 5). The Examiner finds that "constant pressure" is the same as "constant flow of plasma gas." *Id.*

We reverse the Examiner's § 112, ¶ 4 rejections for the reasons argued by Appellant on pages 10–15 of the Appeal Brief. As argued by Appellant, the recitation of "gas hose" in the dependent claim is broader than the requirements of dependent claims 8, 9, and 22, which further limit the gas hose in terms of its dampening function. Moreover, Appellant argues that constant flow of gas is a different measure than constant pressure (App. Br. 13). Appellant contends that constant flow is a measure of the rate of movement of gas entering the torch and constant pressure is a measure of the force per unit area exerted by the gas on the container or hose which contains it. *Id.* The Examiner does not respond to these arguments other than to reiterate the position that constant flow is synonymous with constant pressure (Ans. 16). We are unpersuaded by the Examiner's unsupported position.

REJECTION (4): § 103

The Examiner finds that Higgins teaches the method recited in claims 1 and 17, except for cycling the valve between the fully open and fully closed positions (Ans. 6–7). The Examiner finds that Higgins teaches determining the pressure of the plasma gas provided to the valve 106 inlet using a transducer 104 or pressure regulator 102 (Ans. 6, 17). The Examiner finds that ¶ 26 of Higgins teaches determining a duty cycle for the valve

(Ans. 7). The Examiner finds that Hammer teaches a method of controlling gas flow including controlling a gas valve that is cycled between fully open and fully closed (Ans. 8). The Examiner concludes that it would have been obvious to maintain a relatively constant flow of plasma gas to the plasma torch of Higgins using the flow control valve of Hammer by cycling the valve between fully open and fully closed conditions to accurately and rapidly control the rate of fluid flow to the plasma torch (Ans. 8).

Appellant argues that neither Higgins nor Hammer teaches using an inlet pressure to the valve 106 to determine the frequency and duty cycle at which to cycle the valve (App. Br. 19). Appellant contends that the Examiner's reliance on Higgins' mass flow transducer 104 prior to the inlet of valve 106 to teach a sensor prior to the valve inlet is misplaced because the mass flow transducer does not measure pressure (App. Br. 18). Appellant argues that the Examiner's reliance in the Response to Arguments section of the Answer on pressure regulator 102 in Higgins as measuring the inlet pressure to the valve 106 does not meet the claim (Reply Br. 9). Appellant contends that "determining" the pressure at the valve inlet requires measuring or sensing the pressure at the valve inlet. *Id.* Appellant argues that Higgins does not teach ascertaining a frequency or duty cycle because valve 106 is never cycled (Reply Br. 11). Appellant argues that Higgins teaches adjusting the pressure of the plasma gas, not cycling the valve (Reply Br. 12). Appellant argues that combining Hammer's valve that cycles without feedback control with Higgins would frustrate the purpose of Higgins that uses feedback control to monitor the plasma torch performance (Reply Br. 16–18, App. Br. 25–26).

The preponderance of the evidence favors Appellant's argument of non-obviousness. "Duty cycle" is described in the Specification as the quotient of time that the valve is open (t_{open}) divided by the time for a complete cycle of fully opening and fully closing the valve (Spec. ¶ 19). In other words, the duty cycle requires that a valve completes a regular cycle of opening and closing the valve.

The Examiner's reliance in the rejection on Higgins' mass flow transducer 104 as measuring the inlet pressure is incorrect. The Examiner seems to acknowledge this error in that the Examiner relies on pressure regulator 102 in the Response to Arguments section of the Answer for the device that measures the inlet pressure (Ans. 17). The Examiner does not, however, explain how the pressure regulator is used to determine a duty cycle as allegedly disclosed in Higgin's ¶ 26. Rather, it is the mass flow transducer 104 that communicates with controller 120 and pressure setting device 110 to control the valve 106 (Higgins ¶ 26).

Moreover, the Examiner does not explain why the opening or closing of the valve 106 in ¶ 26 of Higgins constitutes a duty cycle as that phrase is described in the Specification. It appears that ¶ 26 merely describes opening or closing valve 106 to control pressure of the plasma gas based upon the feedback controls (i.e., pressure transducer 108 at the valve outlet, mass flow transducer 104 and pressure setting device 110). Higgins relies on the feedback control system to monitor the plasma torch and control valve 106 (Higgins ¶¶ 26, 31). As argued by Appellant, Hammer teaches that cycling of the device 1 is very predictable and reproducible so that the flow control devices can be run on an open loop control arrangement eliminating the need for a flow rate sensor or feedback loop (Hammer, col. 8, ll. 4–9). Hammer

instructs that elimination of the feedback loop saves processing time (col. 8, ll. 9–13).

The Examiner does not explain sufficiently why one of ordinary skill in the art would have substituted Hammer's valve that operates in a cyclical manner and can be free of feedback controls for Higgins' valve 106 that is responsive to feedback controls. Indeed, the Examiner's response that the claim does not exclude feedback control, fails to address Appellant's argument there is no apparent reason to combine the teachings of the references in the manner proposed by the Examiner. As noted above, we agree with Appellant that Higgins fails to teach determining a duty cycle for the valve 106. Accordingly, it is not clear that the combined prior art would have suggested all the limitations of the claim or that there is sufficient reason for the modification proposed by the Examiner. We reverse the Examiner's § 103(a) rejection over Higgins and Hammer.

DECISION

The Examiner's decision is reversed.

ORDER

REVERSED